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Division of Mycology and Disease Survey

Volume XXII Number 2

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BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

Vol. XXII Number 2

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IN THIS ISSUE

Theodore J. Grant and Carl Hartley list many new records of a witches'-broom on black locust, and report a similar disease on honey locust, pages 28 and 53.

An occurrence of soft rot of hyacinth in California is reported by H. G. Mac Millan and O. A. Plunkett on page 31, with facts assembled, which have a bearing on the origin and development of the rot.

Notes on fruit diseases in the Ozark section of Arkansas in 1937, by John C. Dunegan include, apple, cherry, and peach diseases, page 34.

A summary of orchard surveys of apple diseases in Pennsylvania in 1937 is given by R. S. Kirby and others, page 38.

W. J. Zaumeyer, B. L. Wade, and J. R. Mullin report a bean disease survey in Colorado in 1937, page 39.

"Purple Top" wilt, which developed to a considerable extent in North Dakota in 1937 is reported by W. E. Brentzel, page 44.

Occurrence of tobacco diseases in Virginia in 1937 is reported by J. A. Pinckard, page 45.

E. C. Tims and P. J. Mills report some new hosts for Corticium stevensii in Louisiana, page 50.

The Survey asks for the reports, not yet received, for the 1937 annual summary at an early date, page 50.

Brief notes, page 51, include Phytophthora root rot of calla lily in Florida and anthracnose of privet in Ohio, by Lucia McCulloch; scab on firethorn in Ohio collected by R. J. Haskell and A. L. Pierstorff; and rust on Oregon grape by Frank P. McWhorter.

Precipitation for the year 1937, page 51.

A WITCHES'-BROOM ON BLACK LOCUST AND A SIMILAR DISEASE ON HONEY LOCUST

Theodore J. Grant and Carl Hartley

Witches'-Broom of Black Locust

The witches'-broom of black locust, Robinia pseudoacacia L., was reported by C. E. Waters in Plant World for 1898.1/ He had collected broomed material in 1895 in Anne Arundel County, Maryland. This material had been examined by J. E. Humphrey, who could find no living organisms that might have caused the disease.

Subsequently witches'-brooms on black locust have been found in a number of different States. A record of these is summarized by States as follows:

Maryland and Washington, D. C.

Year	Locality	Observer	Record
1899	Woodwardville, Md.	M. B. Waite	Phytopath 19:163-166
1908	Chevy Chase Lake, Md.	W. A. Taylor	"
1914	Near Washington, D.C.	Erwin F. Smith	Photo. Div. For. Path.
1926-29	" " "	Haven Metcalf, Carl Hartley, G. F. Gravatt	Div. For. Path.
	Since that time Hartley has observed and followed the progress of the disease in several places in Washington and vicinity.		
1928	Potomac Hts., D. C.	C. A. Ludwig	Myc. Coll. B.P.I.
1929-32	Washington, D. C.	"	"
1933	Sugar Loaf Mt., Md.	R. K. Beattie	Coll. Div. For. Path.
1936	Port Republic, Md.	Annie R. Gravatt	Oral report
1937	Herald Harbor, Md.	J. A. Stevenson	" "
1937	Frederick, Md.	Writers	Observation in October.
	Smithsburg, Md. (3 miles north)	"	" " "

Virginia

1899	[Near Washington, D.C.]	M. B. Waite	Phytopath. 19:163-166
1905	Arlington Farm	W. A. Orton	Myc. Coll. B.P.I.
1908	Riverton and Roanoke	Horace Engler	Phytopath. 19:163-166
1928	Winchester	F.J.Schneiderhan	P.D.R.Suppl.72:352.1929
1932	Tappahannock	Carl Hartley	Oral report
1933	Rappahannock Co. Great Devils Staircase	W. W. Diehl	Myc. Coll. B.P.I.

1/ See also page 53 for additional records.

Virginia (Contd.)

Year	Locality	Observer	Record
1934	Vienna and Fairfax	S. B. Detwiler	Oral report
1934	Rapidan River, Hoover Camp	J. A. Stevenson, W. W. Diehl	Myc. Coll. B.P.I.
	Subsequently Stevenson and Diehl have observed scattered brooms along the Skyline Drive between Thornton and Swift River Gaps.		
1937	Elkton	S. B. Detwiler	Oral report
1937	Mt. Weather on Blue Ridge	"	" "
1937	Lexington (12 miles west on Route U.S.60)	Writers	Observations in October
	Verona	"	" " "
	New Market Gap	"	" " "
	Broomed sprouts are now common in that portion of Virginia near Washington, being most frequent on areas where locust trees have been felled and sprouts have been cut back.		

West Virginia

1920	Morgantown	John L. Sheldon	P.D.R. Suppl.17:296.1921, P.D.R. Suppl.72:352.1929
1928	Cheat River	W. A. Archer	Myc. Coll. B.P.I.
1937	Parsons	Carl Hartley	Oral report
1937	Hugheston (1 mile west)	Writers	Observation in October
	Falls View	"	" " "

North Carolina

1922	Curtis Creek	Appalachian For. Exp. Sta.	Phytopath. 19:163-166
1926	Near Asheville	Hartley and Haasis	"
1927	" "	R. M. Nelson	"
1937	" "	George Hepting	Correspondence

Georgia

1914	Elijay	G. G. Hedgcock	Phytopath. 19:163-166

Pennsylvania 1/

1923±	Paxtang, Dauphin Co.	W. A. McCubbin	P.D.R. 13(14):173.1929
1925±	New Cumberland, York Co.	"	"
1927	Lancaster (3 miles north)	"	"

1/ See also page 53.

Pennsylvania (Contd.)

Year	Locality	Observer	Record
1928	Mont Alto	Carl Hartley	Phytopath. 19:163-166
1929	Oberlin, Dauphin Co.	W. A. McCubbin	P.D.R. 13(14):173.1929
1929	Between Mt. Holly Springs and Hunters Run, Cumberland Co.	"	"
1929	Quincy, Franklin Co.	"	"
1929	Fayetteville, Franklin Co.	"	"
1929	Marysville, Perry Co.	"	"
1929	Harrisburg	C. S. Anderson	"
1929	Quarryville	F. L. Holdridge	"
1937	McConnellsburg	Writers	Observation in October
	Rays Hill	"	" " "
	Johnstown	"	" " "
	Seward	"	" " "
1937	Gaylyville (mild brooms)	"	" " "

Ohio

The writers recognized an intermediate type or mild form of brooms, characterized by branch proliferation, with shortened leaves and leaflets about one-fourth their usual size. The leaflets have acute-angle bases, wavy margins, often blunt tips, and vein clearing which gives the leaflet a blue-green cast.

1937	Hopedale (1.3 miles east) (mild brooms)	Writers	Observation in October
1937	Moorefield (4 miles east) (mild brooms)	"	" " "
1937	Zanesville (10 miles east of Hebron) (mild brooms)	"	" " "
	Minerva (mild brooms)	Ralph C. Hall	Oral report
	Clarksville (mild brooms)	Writers	Observation in October
	Oxford (mild to extreme brooms)	"	" " "

Kentucky

1937	Butler (6 miles east) (mild brooms)	Writers	Observation in October

A Witches'-Broom on Honey Locust

In October, 1937 the writers found what was believed to be the first case of brooming disease on honey locust, Gleditsia triacanthos L. On State Route 63 about two miles west of Lebanon, Ohio in Warren County, and 125 yards east from the county line entering Butler leaving Warren County, the writers found, on the left of the road, a group of broomed honey locust sprouts coming from an old stump two feet in diameter.

The second example of broomed honey locust was found on route U. S. 27 in Kentucky about eight miles from Central Bridge at Cincinnati.

Subsequently, correspondence from John L. Sheldon stated that Mrs. Sheldon had seen broomed honey locust in the vicinity of Morgantown, West Virginia.

The writers are anxious to obtain additional information on the distribution of witches'-brooms of honey and black locusts and would appreciate receipt of specimens from new localities. These should be addressed to T. J. Grant, Arlington Farm, Rosslyn, Virginia. (Hill Culture Section, Soil Conservation Service and Division of Forest Pathology, Bureau of Plant Industry cooperating).

AN OCCURRENCE OF SOFT ROT OF HYACINTH

H. G. Mac Millan and O. A. Plunkett

Florists in the Los Angeles district of California growing hyacinth plants for the wholesale flower market have suffered losses this season from a bacterial soft rot of the bulbs, the growing plants, and the inflorescence. As the outbreak developed rather quickly, is of considerable economic importance in loss of bulbs, time, and prospective market, as well as a new experience to growers of long standing in the Los Angeles district, it seems worth while to assemble what facts have a bearing on the origin and development of the rot.

Practice and Purpose of the Florists

The bulbs in which the rot has appeared are all imported. Apparently no hyacinth plants are developed from American-grown bulbs by local florists. The bulbs were received in New York in a single shipment, and a portion of them were forwarded by rail to reach the florists for early forcing. These were received about September 5. The remainder were reshipped by water through the Canal and received at San Pedro about October 10.

A portion of the bulbs had been "prepared" in growing; that is, given a heat treatment in the beds in which they were grown to hasten maturity.

Many of these were planted out in pots as soon as received. Others were potted and put in cool storage to delay growth until such times as were regarded correct to bring them into flower for selected dates. The most profitable market for the early, forced blooms is the period close to the date of Christmas.

The florists all use clean soil throughout for each planting. It is usually a sandy loam mixed with 25 percent or more of well rotted manure. The potted bulbs are set in the ground for about thirty days, or until growth begins. They are then put in glass or muslin houses, covered to exclude the light, and given artificial heat, the temperature being kept between 70° and 75° F. The purpose of this latter treatment is to have the leaves and scape grow up from the bulb before flowering, otherwise the flower blooms directly on the top of the bulb giving a poorly proportioned plant. After being forced to the proper size and development the plants are finished off in the light. Among the florists there are individual differences in handling, in equipment, and in selection of planting dates, all of which may have induced minor variations in the onset or severity of the disease. Essentially their methods, equipment, and experiences are similar.

The Appearance of the Disease

The variety Nic Dames was badly rotted when received either by train or by boat. None of these came to our attention at that time. The other varieties showed little or no rot when received. Some time after the bulbs were planted in the pots some rot began to appear, but not in enough volume to cause any comment or alarm. When the potted bulbs were placed under forcing conditions with artificial heat, and confined in darkness, which confinement presumably increased the humidity, several manifestations of disease developed. The bulbs rotted outright in some cases, the fleshy parts within becoming a wet, slimy, rotten mass, enclosed by the crust of dried outer scales. The greater number, however, developed decay with the growth of the plant. The fringe of the scales at the point where the bud emerges became wet-looking. The entire cylinder of the bud could then be lifted out of the bulb. The end of the cylinder and the stem within the bulb were soft-rotted, slimy, and a light grayish tan in color. As the rot advanced the decay progressed upward and the entire bud collapsed, or in some cases, single leaves of the bud decayed in advance of others. By this time, of course, the remainder of the bulb had pretty well decayed. Some plants in which the leaves had begun to separate and the inflorescence become exposed showed one or more flowers of the inflorescence water-soaked and rotten, and on being pulled away exposed the slimy soft rot below. The root development on the affected growing plants was always excellent. In the preferred varieties, forced to the point where the inflorescence was about to emerge, the loss on December 20 was about 20 percent.

Furthermore, it is the opinion of the florists that the plants generally are retarded in their development, and are not the proper color or size

for the time and conditions under which they have been forced. They are afraid that all will succumb.

The Organism

No culture work has been done on the organism here. To all appearances except proof by cultural technic it is Bacillus carotovorus Jones. The bacteria are present in practically pure culture, and are abundant in the inner rotted parts of the bulbs. The bacteria stain easily, and the measurements correspond fully with the B. carotovorus measurements. Flagella stains show the flagella to be as described by Jones 1/. The type of rot, the characteristic odor of the rotted parts, the measurements and flagella, and the ability of the bacteria to induce typical soft rot in carrots convince us of the identity of the organism as B. carotovorus.

Discussion

The soft rot of hyacinth in the bulb and pre-flowering stages under growing conditions has not been reported in America. Heinz 2/, who first described the soft rot of hyacinth, speaks of the rot in plants in the flowering stage. Jones 1/ in his inoculation experiments used plants in the flowering stage. Coons 3/ describes and illustrates the disease as appearing in potted plants in flower.

The precise origin and circumstances of the infection of the bulbs and plants in growth cannot be determined by us. The fact that several growers experienced the same disease in the same varieties; that the several varieties passed through the same circumstances of handling and transportation but reacted differently; the unusual circumstances of care and sanitation used by the florists; and the fact that the seat of the infection is well within the interior of otherwise sound-looking and uninjured bulbs, all indicate that infection must have taken place in the process of bulb production or harvesting. It may well be that hyacinth bulbs are commonly exposed to and infected by this organism, but that normal handling subsequently fails to develop the disease. These bulbs encountered unusual conditions. In the process of being "prepared" they were finished off last April in artificially heated soil

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1/ Jones, L. R. A soft rot of carrot and other vegetables. Vermont Agr. Expt. Station. Ann. Rpt. (1899/1900) 13:299-332 illus. 1901.

2/ Heinz, A. Zur Kenntniss der Rotzkrankheiten der Pflanzen. Centbl. Bakt. (etc.) Bd. 5:535-539. 1889.

3/ Coons, G. H. The soft rot of hyacinth. Michigan Acad. Sci. Ann. Rpt. 20:353-354. illus. 1918.

at a temperature of 70° F. or more. In transportation during the late summer they encountered warm conditions. The method of forcing requires temperatures and conditions which are optimum for the growth of the organism. However, a florist who forced hyacinths for the 1936 Christmas market reported no loss whatever from this disease.

That the organism causing the disease is Bacillus carotovorus there is no reasonable doubt. Heinz 2/ may have been remiss in the scope and methods of his technic as pointed out by Smith 4/, but there is no doubt, as stated by Coons 3/ that the rot is the same as described and named by Jones 1/ Bacillus carotovorus. Every detail except final proof by extended culture work confirms the opinion. (Division of Fruit and Vegetable Crops and Diseases, and University of California at Los Angeles).

NOTES ON FRUIT DISEASES IN THE OZARK SECTION OF ARKANSAS IN 1937

John C. Dunegan

The 1937 growing season in northwest Arkansas was not marked by adverse conditions such as abnormally high temperatures, droughts, or early freezes, which have played such an important part in the production of fruit during the previous three years. While the precipitation in March, April, and May 1937 was below normal, there was an abundance of rain through the summer and the temperatures remained at a seasonable level. In short, the environmental conditions of the 1937 season were so much superior to those of the previous years that fruit growers were inclined to consider the season almost ideal.

Apple Diseases

Apple Scab (Venturia inaequalis). This disease was of little importance in northwest Arkansas during the 1937 season. In a spray experiment using the very susceptible Ben Davis variety only 5.5 percent of the crop of the non-sprayed trees was affected, while only 0.1 percent of the fruit was affected on the trees receiving the standard lime sulphur-Bordeaux mixture sprays. Similar results were obtained in the commercial orchards throughout the district.

A number of factors are responsible for the very minor part played by this disease in 1937 but probably the most important is the small quantity of overwintered inoculum available following the drought of 1936. Furthermore, very few perithecia developed on the overwintered leaves and the maturation of the ascospores was greatly retarded. The first scab lesions on

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4/ Smith, Erwin F. The bacterial diseases of plants. V. Amer. Nat. 31:34-41. 1897.

the leaves were noted on May 4 and lesions on the fruit were found the following week. Although there were several periods of comparatively cool, rainy weather during the first half of May, favorable to the spread of the scab fungus, only a limited number of secondary lesions developed on the leaves and fruit and comparatively high temperatures during the last half of the month effectively brought the scab season of 1937 to a close.

The 1937 season therefore illustrates still another combination of factors influencing the development and prevalence of the scab fungus. In 1936 there was an abundance of overwintered inoculum, following the scab epiphytotic of 1935, but the lack of moisture in the early spring limited the number of infections. The ensuing drought and high temperatures adversely affected the further development of the fungus and the disease was of little importance. In 1937 there was very little overwintered material available to serve as a source of inoculum for new infections and perithecia developed on only a few of the overwintered leaves. Ascospore formation was delayed and the initial infections did not appear until early in May on the leaves and fruit. The further spread of the fungus was soon reduced by the unfavorable temperatures of early summer and again, as in 1936, the disease did not attain any importance.

Apple Blotch (Phyllosticta solitaria). This fungus has been adversely affected by the summer droughts of 1934, 1935, and 1936 and has been of no commercial importance for the past three years. The return to more normal weather conditions during 1937, with frequent rains through June, July, and August, furnished conditions favorable to blotch infection, and the disease became more prevalent throughout the entire district. In addition to climatic conditions favoring the development of the fungus, this increase in prevalence must also be attributed in part to the fact that the fruit growers, after it became apparent that the scab fungus would not be a major problem in 1937, relaxed their spraying operations and the fruit was not adequately protected against the late summer rains.

Fruit infections were noted on non-sprayed Ben Davis on June 17 and became more prevalent as the season progressed. While the total amount of blotch did not reach serious commercial importance, yet the amount present indicates a decided "come-back" on the part of the fungus following the drought years.

Bitter Rot (Glomerella cingulata). While this disease has not been of commercial importance in northwest Arkansas orchards for many years, yet isolated cases exist. The continued development of the disease on the fruit in these orchards year after year serves to illustrate how well this fungus is able to withstand adverse conditions. In 1937 the Ben Davis crop in one of these orchards was destroyed by the bitter rot fungus and the fungus was readily isolated from apple leaf spots as well as from the fruit. These results, coupled with the complete destruction of the crop, indicate that the droughts of the past three summers have had little effect on the fungus in this orchard.

Minor Apple Diseases

Sooty Blotch (Gloeodes pomigena). Grimes Golden apples almost completely covered by the sooty blotch fungus were noted in one orchard. This was the most aggravated case of this disease that the writer has encountered. Occasional spots of the fungus were also observed on Ben Davis in the same orchard, the trees of which had not been thoroughly sprayed after the middle of June.

Apple Rust (Gymnosporangium spp.). Typical lesions of the common apple rust, Gymnosporangium juniperi-virginianae, were observed on various varieties during the season, but they were not numerous enough to cause any serious loss.

The fungus, Gymnosporangium clavipes, attacking the Delicious varieties appears to be increasingly prevalent. The fruit of the Red Delicious in one small orchard was so distorted in shape by this fungus that the prospects of a commercial crop were materially reduced.

Jonathan Spot (Physiological). Fruit of this variety harvested late in September and held several days in orchard sheds before being transferred to cold storage developed an aggravated case of Jonathan spot and required considerable culling before the fruit was packed for storage.

Arsenical Injury. Fruit of the Golden Delicious variety in an orchard near Rogers developed the typical calyx-end type of arsenical injury. This injury, which involved about 2 percent of the crop, could not be attributed to incorrect spraying procedures. Because of economic conditions the grower had been unable to apply fertilizer to the orchard during 1936 and the entire orchard showed the effect of the lack of nitrogen. The injury was most pronounced on the weaker trees and it was considered that the condition represented a definite example of the relation between the vigor of the trees and spray injury.

Brown Rot (Sclerotinia fructicola). Occasional specimens of the brown rot fungus on apple have been observed in past seasons and the disease (although never of any great importance in northwest Arkansas on apples) was unusually prevalent in 1937. In the past the affected apples have always been those that have dropped to the ground but in 1937 several specimens were noted hanging on the trees.

Cherry Diseases

Leaf Spot (Coccomyces hiemalis). Examination of overwintered cherry leaves on April 11, 1937 showed that the ascospores of Coccomyces hiemalis were in the process of formation, and a further examination on April 29 showed an abundance of ascospores as well as asci which had discharged their spores. The leaf spot disease did not appear in the commercial Montmorency orchards until the middle of June as the fruit began to ripen. In properly sprayed

orchards the disease, therefore, had little effect upon the 1937 crop. Most of the growers applied a spray immediately after the fruit was harvested to check the small outbreak of leaf spot which had developed during the period when they could not spray without seriously spotting the maturing fruit.

Brown Rot (Sclerotinia fructicola). The brown rot disease was not observed on the Montmorency variety but small plantings of Napoleon, Bing, and an unknown variety of white cherry were affected by fruit rot as they matured during the period June 5 to June 19. The weather conditions with frequent showers, high humidity, and moderate temperature furnished ideal conditions for infection of the maturing fruit. The fungus destroyed more than half the crop of the unknown white variety in the small planting near Fayetteville.

Peach Diseases

Brown Rot (Sclerotinia fructicola). At Fayetteville, Arkansas, small stipes, one- to three-quarters of an inch long, with swollen tips were noted on buried peach mummies during the week of February 20, and fully expanded apothecia were observed in the orchards on March 23.

In northwest Arkansas the brown rot fungus did not cause any serious loss but in the eastern part of the State (i.e. Crowleys Ridge section) a number of growers reported that the blossom blight phase of the disease was very serious on the Early Wheeler (Red Bird) variety. One grower reported that a potential crop of 10,000 bushels was reduced to 2,000 bushels as the result of blossom blight. An examination of this particular orchard near Augusta, Arkansas early in June revealed the presence of blighted blossoms but not in sufficient quantities to confirm the grower's statement that blossom blight caused a crop reduction of 8,000 bushels.

Spray Injury. As the result of the frequent rains, conditions were exceptionally favorable for the development of arsenical spray injury. In a number of cases small twig cankers were erroneously identified as the after effects of blossom blight, when actually they were caused by the sprays used. Arsenical injury was common in all parts of the State in 1937 and leaf, fruit, and twig specimens were submitted for determination by growers from widely separated areas. As usual the leaf injuries were confused with the leaf spots caused by Bacterium pruni.

Bacterial Spot (Bacterium pruni). Typical cases of leaf and fruit infections on peach and leaf spots on cultivated plums were observed in orchards near Fayetteville during 1937. The injury to the fruit was of minor importance, however, from a commercial standpoint. (Cooperative work between the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, and the Arkansas Agricultural Experiment Station).

SUMMARY OF APPLE DISEASE SURVEY IN PENNSYLVANIA, 1937

R. S. Kirby, G. L. Zundel, A. H. Bauer, and O. D. Burke

Treatments or sprays	Number orchards surveyed	Number apples counted	Percentage of diseased apples									
			*Scab	Brooks spot	Sooty blotch	Blotch	Black rot	Bitter rot	Apple rust	Quince rust	Black pox	Total
Completely sprayed	142	68,735	1.53	.149	.205	.003	.077	.009	.44	.22		2.63
Partly sprayed	247	94,876	13.58	.682	3.52	.063	.279	.167	.36	.117	.093	18.84
Unsprayed	50	5,423	82.75	5.49	41.5	1.69	4.07	.258	.13	.02		100.00
TOTALS	439	169,034	10.89	.62	3.38	.091	.317	.105	.39	.16	.093	16.0
All sprays applied:												
Poor method	35	7,150	23.50	.252	1.21		.196	.04	.21	.11		31.42
Wrong time	4	1,500	16.0	.667	.133		.268			.07		17.15
Poor materials	37	13,200	5.35	.159	.41		.182		.67	.32		7.07
1 Spray omitted	95	39,486	8.33	.47	2.64	.02	.18	.35	.30	.11	.14	12.64
2 " "	50	17,350	14.68	1.08	1.71	.006	.27	.01	.43	.07		18.5
3 " "	22	6,100	23.04	1.08	9.73	.18	.34		.16			34.59
4 " "	12	3,800	23.42	.55	12.31	.34	.71		.58	.08		38.11
5 " "	10	2,290	34.90	1.44	20.72		.525		.044			57.75
6 " "	5	500	68.65	11.4	60.4		2.6		.6			100.0
Total sprays omitted	194	69,526	13.36	.792	4.53	.047	.279	.228	.33	.082	.133	19.8
All sprays omitted but one:												
Delayed dormant	26	9,875	5.17	.132	.314	.09	.286	.335	.43	.03		6.27
Prepink	23	8,100	14.42	.37	.408	.012	.148	1.3	.20	.28		17.15
Pink	15	2,181	22.38	.27	2.13	.046	.186		.41	.14		25.5
Petal fall	5	1,150	15.75	.608	1.13		.608					18.09
1st cover	6	2,000	10.25	.4	1.05	.05	.1		.10			12.75
2nd "	11	4,200	3.48	.238	1.0		.262	.024	.5	.07		5.58
Last "	31	11,750	4.03	.93	7.2		.085		.03			13.24

* Scab [Venturia inaequalis]. Brooks spot [Mycosphaerella pomi]. Sooty blotch [Gloeodes pomigena]. Blotch [Phyllosticta solitaria]. Black rot [Physalospora obtusa]. Bitter rot [Glomerella cingulata]. Apple rust (Gymnosporangium juniperi-virginianae). Quince rust [G. clavipes]. Black pox [Helminthosporium papulosum].

BEAN DISEASES IN COLORADO IN 1937

W. J. Zaumeyer, B. L. Wade, and J. R. Mullin

About the middle of August 1937, a disease survey was made of a portion of the bean acreage in Weld County, Colorado. The garden-bean-seed acreage is estimated at approximately 3,500 acres and that of the field beans at about 60,000 acres. This County produces practically all of the garden-bean seed grown in the State and from one-fourth to one-third of the Pinto-bean acreage. Practically all varieties of the garden beans are grown for seed, and a small acreage is grown for the green market. The principal field-bean variety produced is the Pinto, however, the Great Northern and Robust varieties are grown in smaller acreages.

Bacterial Blights

Bacterial blight (Bacterium phaseoli and B. medicaginis var. phaseolicola). These two organisms caused more widespread damage to both the garden- and field-bean crop during 1937 than they have since 1928. Only a small percentage of the garden-bean acreage is planted from locally-grown seed since it has been proved that the practice of using such seed, especially of the susceptible varieties, may be conducive to heavy disease losses. By importing seed from sections where the blights are of minor significance reasonably blight-free crops can be produced. This practice has reduced the amount of bacterial blight in Colorado to where it has been only a minor factor during the past several years. The field-bean seed is mostly of Idaho origin, although a considerable acreage is planted to home-grown seed every year.

The severe outbreak of the bacterial blights in 1937 was unquestionably brought about by the excess rainfall, together with the normal or slightly below-normal temperatures recorded during the early part of the growing season; i.e. from early June until the middle of July as shown in the graph (Fig. 1). In addition, high winds accompanying several of the rainstorms were a contributing factor in the dissemination of the causal organisms.

Although the amount of blight infection was so small as to be hardly noticeable in the 1936 bean crop, a very small percentage of the seed carried the diseases. This became apparent in the 1937 planting when a trace of seedling infection was noted in acreages planted with 1936 Colorado-grown seed. With the frequent rains accompanied by wind, considerable secondary spread resulted. In some sections the bacterial blights had spread throughout entire fields by August 1, so that almost every plant in such fields was infected.

For the past several years and especially in 1936, when the bacterial blights were of no consequence, the average temperatures during June and July were above normal. This together with sub-normal rainfall and humidity reduced the possibility of secondary blight infection by killing most of the seedlings primarily infected by seed-borne organisms. As a result, normal or above-normal precipitation and humidity in August of those years was no factor

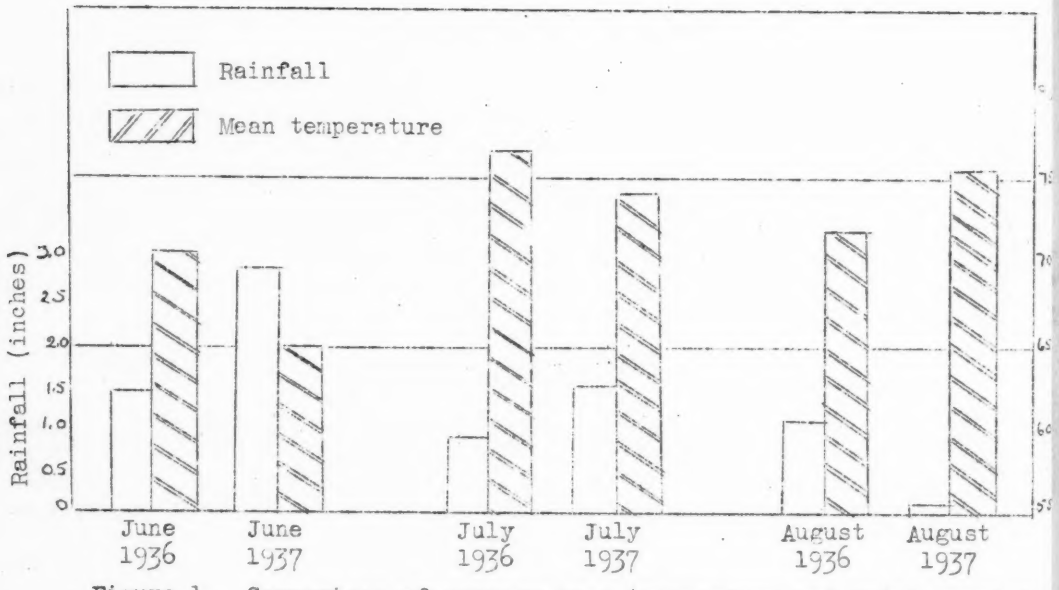

Figure 1. Comparison of average mean temperature and total precipitation for the months of June, July, and August of 1936 and 1937 at Greeley, Colorado.

in the dissemination of the diseases because the primarily infected plants had been elimiated.

In 1937 this was not the case. Above-normal rainfall and humidity combined with sub-normal or normal temperatures in June and July enhanced the secondary spread and development of the bacterial blights from the primary sources of infection. By early August the infection was widespread and the exceedingly high temperatures, which were above normal for that month, caused defoliation of infected plants and premature death with large reductions in yields.

In June 1937, (Fig. 1) the total precipitation for Greeley, Colorado, was 2.85 inches, a departure of +1.30 inches from the normal. Precipitation was recorded on 13 days of this month, on 9 of which .01 inches or more of rain fell. The mean temperature for the month was 65.2°, or a departure of -1.2°F. from normal. Comparing these data with those for June 1936, one finds that the total precipitation then was 1.43 inches or a departure of -0.12 inches from normal. On only 5 days was .01 inches or more of precipitation recorded. In addition the mean temperature for the month was 70° F. or 3.6° above normal. June 1936 was the warmest month recorded in the climatic history of the State.

In July 1937, the total precipitation was 1.53 inches, a slight negative departure from normal. In July 1936, the total precipitation was only 0.79 inches, a departure from the normal of -1.02 inches. In July 1937, precipitation was recorded on 14 days as compared with 9 days in July 1936. In 1937 the mean temperature was 74° F., a slight positive departure from normal as compared with 76.6°, a +5.4° departure for 1936, which was the fourth warmest July on record for the State.

For August 1937, the total precipitation was 0.13 inches, a -1.11 departure, while for August 1936, the precipitation was 1.12 inches, or about normal. The mean temperature for August 1937, the warmest August on record, was 75.4° F., a +5.5° departure from normal. The mean temperature for August 1936 was 72°.

The amount of bacterial blight was not so serious in some parts of the County as it was in others. This difference in disease severity was unquestionably largely due to differences in the amount of humidity and rainfall since the origin of much of the seed planted in the various localities was identical. In sections where blight was most widespread, the amount of rainfall during the first two months of the growing season was considerably greater than in sections where the disease was not serious.

In the early examinations, the common blight organism, Bacterium phaseoli, was the most important organism present in fields planted with 1936 Colorado-grown seed. On the other hand infections in fields planted with seed of Wyoming origin were mostly due to the halo blight organism, B. medicaginis var. phaseolicola. In surveying such fields, one could invariably detect the origin of the seed planted from the type of bacterial infection present. Later in the season this was impossible to do as both organisms were prevalent in the most seriously infected plantings.

It has been observed that of these two organisms, Bacterium medicaginis var. phaseolicola thrives better at a cool temperature and B. phaseoli when the temperature is high. In northeastern Colorado, the summer temperatures in 1935 and 1936 were exceedingly high. This fact may have accounted for the greater amount of B. phaseoli infection present in seed produced in Colorado in 1936 than of B. medicaginis var. phaseolicola. Temperature records for the seed-producing areas in Wyoming in 1935 and 1936 were not sufficiently lower than those in Colorado to make it possible to offer an explanation as to why the Wyoming-grown seed carried more halo blight infection than seed of Colorado origin.

In the past, bacterial-blight infection has been difficult to find in the bean-growing territories of southern Idaho. The writers had an opportunity of examining many fields in Weld County in which seed of Idaho origin had been planted. In general the amount of infection in such fields was not serious, in fact, in most instances it was negligible. In most of these fields not even a trace of the disease was found in the early part of the season, indicating that the seed was free of blight infection. As a result, a high

percentage of this acreage was reasonably free from the secondary dissemination of the organisms in spite of the fact that other fields planted with seed of other origin were severely infected. In a few fields where it was definitely known that the seed had been produced in southern Idaho in the previous year, bacterial blight was causing considerable damage. In these fields only a very small percentage of infected seedlings was noted but they supplied a sufficient amount of inoculum to cause a great amount of secondary spread. In one particular instance not a single plant was free from infection, however, little pod infection was observed.

It should not be assumed that all seed grown in Colorado is infected with the blight organisms. In 1937, a considerable acreage of the Bountiful variety which had been grown in Colorado in 1936 was planted in several locations in northeastern Colorado and only a mere trace of the disease was noted in any of the plantings.

Some evidence was collected indicating that grasshoppers were vectors in the dissemination of the bacterial blights. The infestation of grasshoppers was very severe in Colorado in 1937. Where a field of beans was located adjacent to an alfalfa field or to grain, the hoppers migrated in great numbers to the beans after those crops were cut. It was frequently evident that bacterial blight was more serious in fields or parts of fields where the hoppers were numerous than in those where they were fewer in number. It was also true that in large bean acreages, more blight was evident in those parts of the field where the hoppers had migrated from adjacent hay or grain crops.

In this survey, 103 representative irrigated fields comprising approximately 1,600 acres, were examined. Of this about 560 acres were planted to garden beans, while 1,040 acres were in field beans, mostly of the Pinto type. The exact origin of the seed in most instances was unknown, but it was either from local, Wyoming, or Idaho sources. No fields grown under dry land conditions were examined, although the disease was reported as quite serious in these plantings.

Table 1 shows the estimated loss in the field and garden bean acreage.

In summary, it shows that 37 percent of the field-bean and 33 percent of the garden-bean acreage examined was seriously infected with the bacterial blights. Very few fields so infected were a total loss, but the seed yields were reduced to about one-third to one-sixth of the normal. Thus the approximate loss of the garden beans was about 22 to 28 percent and of the field beans was about 25 to 30 percent. Much of this seed, although salable would be infected even after milling and hand-picking.

Table 1. Estimated number of acres of fields and garden beans infected by bacterial blights.

Estimated percentage of serious blight infection	Number of acres of field beans examined [a]	Equivalent number of acres of field beans seriously infected	Number of acres of garden examined	Equivalent number of acres of garden beans seriously infected [b]
0	45	0	93	0
1-2	70	1	55	1
5	40	2	38	2
10	160	16	110	11
15	65	10	--	--
25	90	22	10	3
30	--		18	6
35	115	40	20	7
50	125	62	75	37
60	70	42	30	18
75	140	103	97	73
80	105	86	10	9
90	6	5	28	28
100	--	--		
	1031	389 or 37%	584	195 or 33%

[a] The total acreage of a number of fields falling into each respective percentage class.

[b] The equivalent number of acres which were seriously infected. This acreage was determined by multiplying the number of acres examined by the estimated percentage of serious blight infection.

Other Diseases

Root rots (*Fusarium* and *Rhizoctonia* sp.). A considerable acreage of field beans in Weld County was planted from the first to the middle of May. On the nights of June 5 and 6, the temperatures dropped below freezing, and a few days of unusually cold weather followed. Many of the early-planted beans were slightly frosted and with slow growth following, became susceptible to and infected by *Fusarium martii* var. *phaseoli* and *Rhizoctonia* sp. In some fields 100 percent of the plants were infected and in certain instances, as many as 25 percent of them died. Because of this reduced stand and the possibility of many of the surviving plants not growing to normal size, approximately 8,000 acres of the early-planted beans were replanted, and 2,000 acres were plowed up and not replanted.

Rust (*Uromyces phaseoli typica*). Although bean rust was more prevalent in 1937 than in 1936, which was the first year it had been noted to any extent since 1928, it did comparatively little damage. One Pinto bean field

of twenty acres, however, was practically destroyed. Rust was found in practically all fields of very susceptible varieties in amounts ranging from a trace to 1 to 2 percent.

Mosaic (virus). Bean mosaic was observed in many fields, but because of the serious blight epidemic, it was difficult to determine the extent of infection or the approximate loss due to it. (Division of Fruit and Vegetable Crops and Diseases.

"PURPLE TOP" WILT OF POTATO IN NORTH DAKOTA

W. E. Brentzel

A potato wilt disease, known by many as "Purple Top" wilt developed to a considerable extent in North Dakota in 1937. In many potato fields the disease became alarming last fall and has since been more troublesome because of the weakening effects of the wilt on the tubers.

Symptoms

About the middle of June, in some fields, a few plants, perhaps 1 percent, showed traces of purple top without root symptoms. On August 20, 3 to 5 percent of the plants were definitely diseased with small crinkly leaflets showing purple about the veins. On September 1, following warm weather, about 20 percent of the plants in these fields showed severe crinkling of the leaflets with purple veins. The purple extended down the main stems to the ground line. Aerial tubers formed on almost all plants, generally near the soil but often higher up on the plants. The leaves often were wilted, somewhat resembling the effects of streak. Later the plant wilted down. No dwarfing was apparent, on the contrary many of the affected plants were large and thrifty.

The stolons often were "beaded" and an abundance of fibrous roots developed. Very commonly some of the root tips emerged from the ground and formed green shoots. In late potatoes there seemed to be a falling off in yield and many of the tubers were small, similar to the effects of rhizoctonia. In early planted potatoes there was no apparent effect on yield. One field of Triumphs showing 20 percent of late wilt at Hillsboro yielded more than 400 bushels of tubers per acre, and all were of a very good size.

In many cases the tubers showed stem-end discolorations and the stems were discolored in the vascular region, especially near the seed piece. In all cases the seed piece was rotted and the focus of infection appeared to be about the seed piece with many roots, mostly dead, emerging from that point. Often the tubers were soft or shriveled but this condition did not occur in all hills. The tubers had a peculiar dull red color and often were very smooth with shallow eyes. There is some evidence from the 1935 crop that such tubers produce mostly spindling sprouts.

Varieties

All varieties examined, Triumph, Cobbler, and Ohio, were affected. Triumph was perhaps more severely affected than Cobbler, although some strains appeared to be more resistant than others. Only a limited number of fields of Ohio were observed.

Rotations

The disease occurred on all types of soil, apparently irrespective of crop rotations. It was reported as prevalent in virgin soil, but plantings in this type of soil were not observed personally.

Cultural Practice and Size of Seed Piece

Where the soil was ridged high up about the vines there was some early indication of less wilt near Northwood, but by early September a high percentage of wilt had developed.

Planting whole seed tubers appeared to have no effect on the development of this wilt.

Date of Planting

An early-planted field of Triumph near Hillsboro, planted about May 7, developed about 20 percent late wilt, but the yield appeared to be unimpaired. The wilt evidently developed too late to affect the yield. The tubers were normal in size, although some of them appeared very smooth over the eyes, suggesting weakness. There was an abundance of fibrous root development and "beaded" stolons in the affected hills of this field. In late-planted fields the affected hills had many small tubers, resembling the work of rhizoctonia. The yield was poor, apparently because of the disease. Many of the tubers from affected plants are developing weak spindly sprouts. (North Dakota Agricultural Experiment Station, Jan. 14).

OCCURRENCE OF TOBACCO DISEASES IN VIRGINIA IN 1937

J. A. Pinckard

Seed Bed Diseases

Peculiar weather conditions during the winter and spring months of 1937, together with outbreaks of downy mildew (Peronospora tabacina), and flea beetle (Epitrix parvula), resulted in the heaviest losses of young tobacco plants ever recorded in Virginia. While an occasional seed bed in the southwestern section of the State was reported as being free from the disease, the general situation was a uniformly serious epidemic.

Immediately following the period of most severe losses from downy mildew, which ranged from approximately 25 to 90 percent damage in individual beds, the tobacco flea beetle larvae were found invading stems and roots of plants in the seed beds and in plants immediately after being set in the fields. The combined effect of the flea beetle, in the field, and of downy mildew, in the beds, caused up to 90 percent loss of transplants in certain individual cases. Fields were replanted as many as five times in many cases in order to secure suitable stands of plants. Many growers, being unable to secure sufficient plants for their planned acreage, abandoned portions of fields and went to the Carolinas and Georgia in search of healthy plants. This unfortunate procedure may result in an increase in tobacco diseases in Virginia, although the effect has not yet been detected.

On the basis of planned tobacco acreage for 1937, yield, and prices received to date, it is estimated that the combined action of downy mildew and other diseases, and flea beetle reduced the proposed 1937 tobacco crop approximately 30 percent.

An analysis of the monthly mean temperatures and total monthly precipitation for the periods, December to June inclusive for the past eight years at Danville, is shown in table 1.

Table 1. Summary of monthly mean temperatures and precipitation from December to June 1930 to 1937, inclusive. U.S.D.A. Weather Bureau, Danville, Virginia.

	Monthly mean temperatures (°F.) and precipitation (inches)													
Year:	December of preceding year		January		February		March		April		May		June	
	Temp.	Ppt.	Temp.	Ppt.	Temp.	Ppt.	Temp.	Ppt.	Temp.	Ppt.	Temp.	Ppt.	Temp.	Ppt.
**1937	41.5	5.91	47.7	9.91	41.6	2.77	46.4	1.51	57.9	4.65	67.3	3.04	76.9	4.01
1936	34.0	2.47	34.6	7.81	36.8	4.31	53.0	5.20	55.5	3.81	70.1	.86	75.2	3.14
1935	40.9	2.91	38.9	3.74	41.6	2.27	54.4	5.46	56.0	3.56	65.5	2.81	75.3	1.83
1934	45.7	2.58	42.8	2.03	32.6	4.12	43.6	5.70	58.8	4.11	66.6	5.45	77.4	5.53
*1933	43.0	5.68	46.2	2.43	42.6	3.64	48.4	3.50	58.0	3.68	71.6	7.72	77.0	.69
*1932	49.0	4.16	49.2	4.78	48.7	2.47	45.2	6.28	57.8	3.37	66.4	3.22	76.0	4.23
1931	37.0	4.72	41.4	1.56	44.0	1.37	44.5	3.39	57.0	4.65	66.8	5.93	77.1	3.81
1930	----	----	42.0	3.56	47.6	.99	48.2	2.68	59.4	1.81	70.8	2.93	78.2	3.48

** Serious downy mildew year
* Mild downy mildew years

In 1937, an exceptionally warm winter and generally normal spring was experienced, although substantial precipitation occurred in the downy mildew months of April and May. These environmental conditions are reputedly conducive to the development of downy mildew, which made its first appearance near Danville, on April 29.

The early portion of 1938, which was also accompanied by mild to serious outbreaks of downy mildew, appears to have been similar to 1937.

As reported earlier (Plant Disease Reporter 21:27, 29) the hot dry May of 1936 resulted in little damage from downy mildew in that year, the spring and winter of 1936 being in direct contrast to both 1937 and 1932.

The spring of 1933 was also accompanied by rather serious outbreaks of downy mildew probably as a result of heavy and well distributed precipitation in May (7.72 inches).

From the data presented, there seems to be no sufficient reason why downy mildew was not serious in 1934 and 1935. A detailed analysis of the daily temperatures and precipitation for the downy mildew period of these years indicate a favorable environmental condition for the disease.

Field Diseases

Visits to 90 tobacco farms, in the Piedmont section of Virginia during the growing season, were made and notes on the prevalence of various field diseases were taken.

Nutritional diseases - In general, nutritional disorders were of about the same importance as in 1936.

Potash deficiency was found rather generally although not particularly severe. A distinct relation was observed between the amount of potash applied in the fertilizer mixture and the presence of leaf spots on Granville fine sandy loam. The following table is illustrative.

Table 2. Effect of various fertilizer formulae on the leaf spots of Yellow Mammoth (cut) tobacco growing on Granville fine sandy loam. Chatham, Virginia, September 11, 1937.

Pounds per acre	Formulae used	Estimated loss from leafspots (percent)
none	none	trace
1 000	3-8-0	50
1 000	3-8-3	15
1,000	3-8-6	3
1,000	3-8-9	3
1 000	3-8-12	trace
1 000	3-8-30	trace
1 000	0-8-6 to 6-8-6	trace to 3
1 000	3-0-6 to 3-16-6	trace to 3

Magnesium deficiency (sand drown) appeared to be general although not serious.

No evidences of nitrogen, phosphorous or minor element deficiencies were observed under normal field conditions. However, a considerable quantity of rough or "wild" tobacco resulted from the earlier effects of downy

mildew and flea beetle since many missing plants could not be replaced. In many cases, attempts were made to compensate for the residual fertilizer under missing hills by planting beans or peas.

Unfavorable water relations - Excessive precipitation during the latter portion of the growing season resulted in an outbreak of leaf spots usually considered to be "black fire" or "wet weather spot" (undetermined) and brown spot (Alternaria longipes). The diseases made their appearance following the heavy rains of August 1937. August, with two exceptions, was the wettest August for the past 47 years. Entire fields of unharvested cut tobacco were frequently abandoned, although most primed tobacco had been harvested by this time.

Drowning of tobacco was common on low lands although two cases of apparent drowning were encountered on land which had definitely not been inundated. In one instance, involving approximately 20 acres of primed tobacco, on an Altavista fine sandy loam soil type, the field was practically a total loss when visited for the last time in mid-August. The symptoms of the disease were similar to those of Granville wilt (Bacterium solanacearum) although no pathogenic organisms could be isolated. The Altavista soil series consists of a gray to yellowish gray fine sandy loam, passing at 10 to 14 inches into a compact, friable yellow clay, containing considerable sand; it gradually becomes heavier with depth and is occasionally quite plastic when wet. Although the field was bounded on three sides by drainage ditches 6 to 8 feet deep the soil within 50 feet of these ditches was saturated at a depth of several inches below the surface for several days in July and August. Free water appeared to be securely held by the impervious clay substratum. The Altavista soil series lies well above overflow and is one of the most important soils of the Piedmont area since it ranks favorably with the Durham and Granville series for bright tobacco.

Virus diseases - Ordinary tobacco mosaic (virus) was found on 18 of the 90 farms visited. Losses from the disease were approximately the same as last year. Substantial benefits were derived where control practices were tried. These benefits are illustrated in table 3.

Ring spot was observed on 9 of the 90 farms visited. Usually the disease was found to cause less than 1 percent loss although in one case it amounted to about 5 percent.

Table 3. Resulting cash value of primed bright tobacco infected with ordinary tobacco mosaic at setting time compared with the cash value of healthy plants, Chatham, Virginia, 1937.

Plot No. (1/40 acre)	Treatment	Yield in lbs 1/	Cash value 1/ (Danville market)
1	Diseased	529	$ 62.42
2	Healthy	948	240.02
3	Diseased	506	49.77
4	Healthy	785	188.78
5	Diseased	539	69.32
6	Healthy	951	245.22
7	Diseased	586	49.65
8	Healthy	1087	237.89
9	Diseased	637	46.36

1/ Adjusted to one-acre basis and 100 percent stand. Plots arranged as indicated on Granville fine sandy loam fertilized with 800 lbs. 3-10-6 commercial fertilizer.

Other Diseases

Granville wilt (Bacterium solanacearum) was found on 14 of the 90 farms visited. It was a very serious disease in Halifax, Lunenburg, and Mecklenburg Counties. The disease was found in two instances on recently cleared wood land. The previous history of the land indicated that Granville wilt may be common on abandoned land in these counties since tobacco has been grown here for many years.

Angular leaf spot (Bacterium angulatum) was observed on 3 of the 90 farms visited, losses being minor.

Black root rot (Thielaviopsis basicola) was found on 5 of the 90 farms visited, the soil pH being 6.0, 6.2, 5.6, and 5.4. Normally the tobacco soils of the Piedmont region are more acid than pH 5.4.

Sore shin (Rhizoctonia etc.) was found on 12 of the 90 farms visited. Damage ranged from the loss of only a few scattered plants to 15 percent of a small field.

Brown root rot (undetermined), root knot (Heterodera marioni), lightning injury, and frogeye (Cercospora nicotianae) were observed this year.

Black shank (Phytophthora parasitica nicotinanae) has not yet been found in Virginia. (Tobacco Experiment Station, Chatham).

SOME NEW HOSTS FOR CORTICIUM STEVENSII IN LOUISIANA

E. C. Tims and P. J. Mills

In connection with studies on thread blight of fig in Louisiana caus by Corticium stevensii, this fungus was found to be parasitic on several other plants. At Union post office in St. James Parish golden rod (Solidag sp.) plants growing adjacent to diseased fig trees were found to be affecte Both the sclerotial and basidial stages were found, sclerotia on the stems and mycelial mats with basidia and spores on the leaves. In the northern part of East Baton Rouge Parish, near Port Hudson, C. stevensii was also found on elderberry (Sambucus sp.) bushes growing under a diseased fig tree. Both the basidial and sclerotial stages were found on this host also. Basidiospore cultures of the fungus from both hosts were indistinguishable from the cultures of C. stevensii obtained from fig.

In September, 1937, Mr. Hetrick, an inspector for the State Department of Agriculture, collected several interesting disease specimens near St. Francisville in West Feliciana Parish. Azalea, Pittosporum, and Euonymus plants injured by C. stevensii were found on the grounds of Afton Villa, one of the oldest and best known mansions in the State. Both the sclerotial (on twigs) and basidial (on leaves) stages were found on azalea. Only the sclerotial stage was observed on Pittosporum and Euonymus. Rose bushes, variety Radiance, were also found at Laurel Hill in West Feliciana Parish with sclerotia and basidia of the fungus on stems and leaves, respectively. This is apparently the first report of C. stevensii on any of the above-named hosts in Louisiana.

On January 4, 1937, P. J. Mills found C. stevensii on honeysuckle (Lonicera japonica) and dogwood (Cornus asperfolia), at Union post office in St. James Parish. The honeysuckle vine was twisted around the limbs of a fig tree infected with thread blight. The dogwood tree was situated only a few feet from the same fig tree. Both plants, honeysuckle and dogwood, had only a few scattered sclerotia on an occasional branch, with no definit hyphal threads. (Louisiana Agricultural Experiment Station).

ANNUAL REPORT

We should like very much to issue the 1937 summary early in the year but cannot start compiling it to advantage until much information now missing is supplied. We would be grateful if collaborators who have not yet sent in their reports would do so at an early date within the next two week if possible. We appreciate the fact that our collaborators have a thousand-and-one things to attend to, besides the Survey report.

Your attention is also called to the fact that the omission of potat scab (Actinomyces scabies) from the crop loss estimate form was through an oversight and not through design. Those who have estimates for this diseas are asked to send them in.

BRIEF NOTES

PHYTOPHTHORA ROOT ROT OF CALLA LILY IN FLORIDA; Phytophthora richardiae was isolated in September, 1937, and again in January, 1938, from calla (Zantedeschia aethiopica) tubers and plants grown in Lockhart, Orange County, Florida. It seems that this fungus has not been previously reported from Florida on callas. (Lucia McCulloch, Jan. 25).

ANTHRACNOSE OF PRIVET IN OHIO: Glomerella cingulata was isolated from inconspicuous cankers on privet (Ligustrum regelianum) plants from Perrysburg, Ohio, September, 1937. (Lucia McCulloch, Jan. 25).

SCAB ON FIRETHORN IN OHIO: Specimens of scab (Fusicladium pyracanthae) on firethorn (Pyracantha sp.) were collected by R. J. Haskell and A. L. Pierstorff on the Ohio State University campus, January 3, 1938. Immature perithecia were observed on some of the lesions on leaves. Last year it was reported from Maryland and Oregon. (P.D.R. 21:339).

RUST ON OREGON GRAPE: Mahonia aquifolium has long been a host for the rust Cumminsiella sanguinea. Usually this produces rather inconspicuous spots on the foliage and remains unnoticed by the nurserymen, including those who grow large quantities of the plant. These spots are evident as jaggy wet appearing areas that blend inconspicuously with the fall colors of the leaf surface. The rust itself usually remains inconspicuous. This season, especially around Portland, a mild fall and continued rains have caused an overabundant growth of the fungus so that the spotting is decidedly unsightly. As a result the nurserymen are complaining about the disease and wondering whether it is something new. The spore stage responsible for the unsightly development consists largely of the squat two-celled telia characteristic of the genus Cumminsiella. (Frank P. McWhorter, Jan. 13).

PRECIPITATION FOR THE YEAR 1937

(From the Weekly Weather and Crop Bulletin for the week ending January 11).

Precipitation for the year 1937 (State averages) was generally above normal east of the Mississippi River, except for portions of the eastern middle and upper Mississippi Valley and Lake region. Figure 2 shows that 14 States averaged below normal for the year; the greatest lack was found in Nebraska where the total was only 75 percent of the normal annual fall; the greatest excess, 133 percent, was reported in Oregon.

As in both 1934 and 1936, a wide belt reaching from the southern Great Plains northward to the Canadian border and including Montana, Colorado, Iowa, Missouri, and Illinois, had subnormal rainfall. Texas, Arizona, and Nevada were the only States below normal in 1937 that were above in 1936. Totals

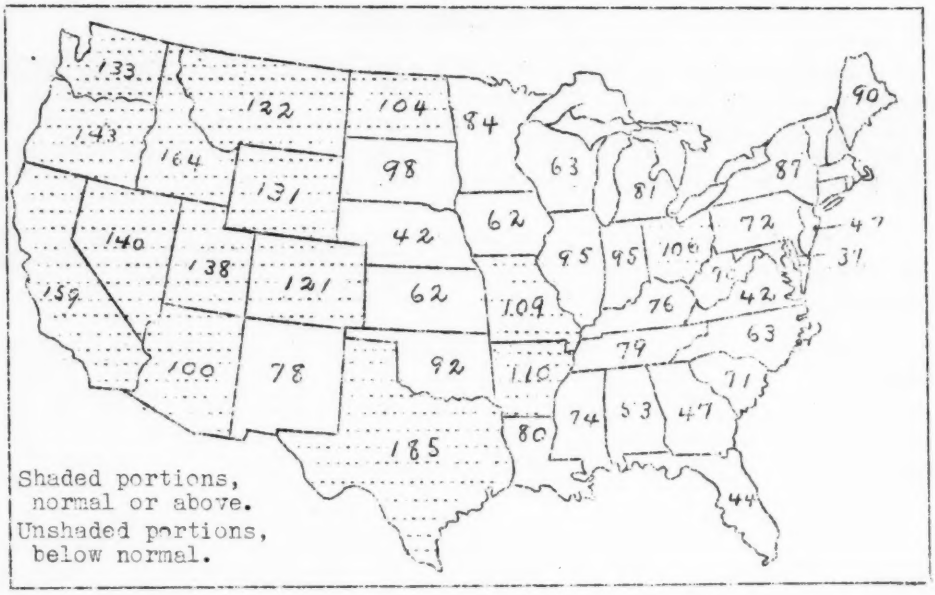

Fig. 1. Percentage of Normal Precipitation for December 1937 (State Averages).

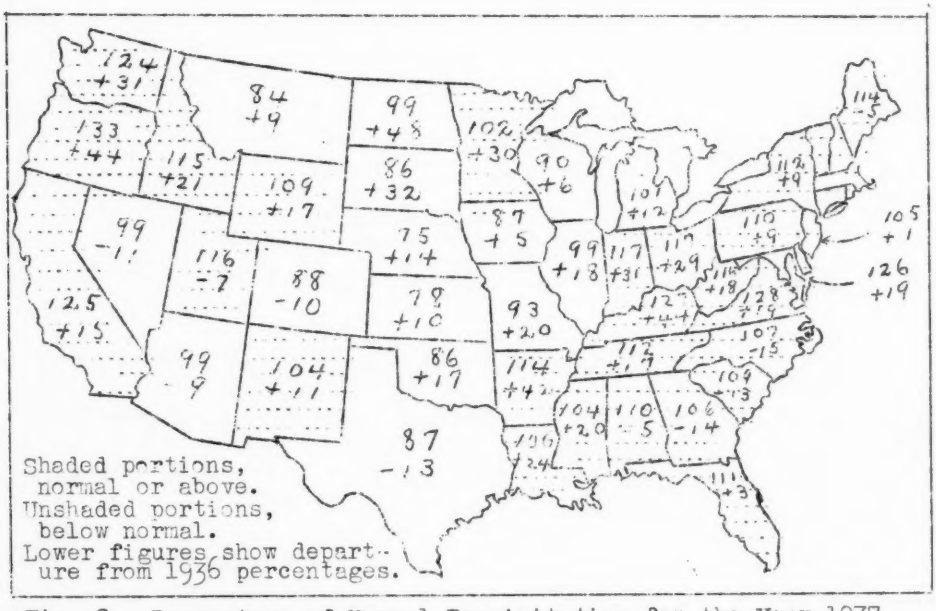

Fig. 2. Percentage of Normal Precipitation for the Year 1937 (State Averages).

for the year just ended averaged from 10 percent to as much as 48 percent greater than in the preceding year over large central and northern areas. In 1934 and 1936 the drought area centered over the northern Great Plains with North Dakota reporting the lowest percent of normal, 54 and 51 percent, respectively. In both these years Nebraska averaged 61 percent of normal; in 1937 North Dakota had 99 percent of normal, an increase of nearly 50 percent, while Nebraska received only three-fourths of the normal yearly rainfall.

Except for the far Northwest, and portions of California where unusually heavy rains occurred late in the year, the most outstanding precipitation fell in the Ohio Valley and the Southeast, culminating in the great Ohio River flood of January, during which new high-water marks were set in several States.

Some of the heaviest monthly falls recorded during the year were reported in Hawaii, where one station, Piihonua, had 95 inches during the months of January and November; in the United States, particularly in the elevated regions of the West and in the Southwest, there were heavy falls. Among these may be mentioned McKenzie, Tennessee, 23.90 inches in January; McNamers, Oregon, 23.45 in February; Big Four, Washington, 19.68 in April; Norwich, Kansas, 12.88 in May; Paradis, Louisiana, 16,75 in June; Clearwater, Florida, 22.31 in July; Davie, Florida, 21.28 in August; Belle Chasse, Louisiana, 29.04 in October; and Valsetz, Oregon, 33.03 inches in November.

The year closed with insufficient subsoil moisture in much of the central Great Plains. Snowfall storage in the higher mountain sections of the West was generally deficient and supplies for spring runoff were considerably below normal in many Western States.

The lower figures, marked plus or minus, on Figure 2 compare the percentage of State rainfall for 1937 with that for the preceding year.

ADDITIONAL NOTES ON WITCHES'-BROOM OF BLACK LOCUST

Theodore J. Grant

Pennsylvania[1/]

Year	Locality	Observer	Record
1889	Mountain, 1 mile north Maryville	John K. Small	U. S. National Herbarium
1921	Near Charmion	Eleanor C. White	" " " "

The 1889 collection is the earliest known at this time. The writer determined these specimens as witches'-brooms. Search through other botanical herbaria might reveal other collections of broomed material, possibly labeled as varieties of Robinia pseudoacacia. (Hill Culture Section, Soil Conservation Service and Division of Forest Pathology, Bureau of Plant Industry cooperating).

1/ See also page 29.